We have some difficulty in judging adequately of this book, since sixteen pages have been left out in binding up the review copy.

(2) For the most part Dr. Hegner's book runs on the familiar lines of comparative anatomy, and his treatment of the structure of animal phyla does not differ essentially from that adopted in any of the recent text-books of zoology, to which, indeed, he is indebted for most of his subject-matter and illustrations. The feature that he claims to be distinctive in this work is the consideration of animal physiology alongside of animal structure. The difficulty has been to compress a treatment of two such large subjects into the compass of a handy volume. Comparative physiology is in itself a large and new subject and would easily require a whole volume of this size. The author has cut the knot by reducing both anatomy and physiology to a condensed form that can scarcely be assimilated by any student. The physiological paragraphs deal mainly with responses to simple forms of stimulation—the behaviour of Paramecium and of Hydra are excellent examples of this—but they do not attempt to show the evolution of physiology amongst animals as do the sections upon anatomy.

Some useful sections are devoted to showing the economic bearing of zoological knowledge. The statement of the food of birds is a good instance of this, though here, again, the need for brief summaries has precluded the insertion of much interesting matter. The remarks on the damage due to insects, for example, are too brief to be of much value.

Compression has been carried too far in the case of invertebrates of uncertain affinities in chapter ix. Either these groups should have been omitted or treated more fully. On the whole the chapter on insects strikes one as being the best in the work, and the treatment of the affinities of animal phyla as the least satisfactory feature of it. The use of the terms "efferent" and "afferent" in connection with the circulation of the crayfish, on p. 283, is the converse of general usage and may lead to considerable confusion. The illustrations are very good and clear; those of the honey-bee, though not original, are sure to be welcome. Fig. 369 is turned upside down. Perhaps the greatest appeal of this very carefully compiled work will be to those who wish to have a book on comparative anatomy in one volume.

(3) This work, by the director of the Natural History Museum at Hamburg, has run into three editions in less than six years, and its success is due to the clear and well-balanced treatment that it contains of both branches of biology. In the present edition the sections on comparative anatomy and on the early races of mankind have been expanded and brought up to date so as to make an exceptionally attractive and very cheap work. Dealing, as the book does, mainly with general problems, it seems rather a pity that the statement of Mendel's method is not clearly given. The essence of the method and its importance can be stated quite simply without going into details. The account that is given here, printed, as it is, in minute type and dealing with a single case, will no doubt be expanded or altered in the next edition.

PHYSICS: OLD AND NEW.

(1) *Junior Magnetism and Electricity.* By Dr. R. H. Jude and Dr. J. Satterly. Pp. vii + 288. (London: W. B. Clive, University Tutorial Press, Ltd., 1912.) Price 2*s*. 6*d*.

(2) *An Introduction to Practical Physics for Colleges and Schools.* By Prof. E. H. Barton and Dr. T. P. Black. Pp. vii + 188; illustrated. (London: Edward Arnold, 1912.) Price 3*s*. 6*d*.

(3) *Mémoires sur l'Electricité et l'Optique.* By A Potier. Publiés et Annotés par A. Blondel. Avec une Préface de Henri Poincaré. Pp. xx + 330. (Paris: Gauthier-Villars, 1912.) Price 13 francs.

(4) *Treatise on Light.* In which are explained the causes of that which occurs in Reflexion, and in Refraction, and particularly in the strange Refraction of Iceland Crystal. By Christiaan Huygens. Rendered into English by Silvanus P. Thompson. Pp. xii + 129. (London: Macmillan and Co., Ltd., 1912.) Price 10*s*. net.

(5) *Intermediate Physics.* By Prof. W. Watson, F.R.S. Pp. xiii + 564. With diagrams. (London: Longmans, Green and Co., 1912.) Price 6*s*. net.

(6) *Lehrbuch der Physik.* By Prof. Eduard Riecke. Erster Band. Mechanik, Molekularerscheinungen und Akustik. Optik. Zweiter Band. Magnetismus und Elektrizität. Wärme. Fünfte, verbesserte und vermehrte Auflage. Pp. xvi + 600 + xii + 775; illustrated. (Leipzig: Veit and Co., 1912.) Price 26 marks. 2 Vols.

(7) *Physik in graphischen Darstellungen.* By Felix Auerbach. Pp. x + 28 + 213 plates. (Leipzig and Berlin: B. G. Teubner, 1912.) Price 9 marks.

(1) SO many elementary text-books of this kind appear from time to time (one of the present authors is already responsible for two) that it is very difficult to judge whether or not a new publication possesses advantages over its predecessors. The scope of the subject is so limited that all of them are bound to be very much alike, and in any one book there can only be a

few special features which demand attention. In the present case little can be said but that the authors have presented what appears to be a straightforward and clear account of the elements of the subject.

The general method of treatment is based upon the two previous text-books of Dr. Jude, more stress being now laid, however, on the practical side of the subject. Descriptions of a large number of experiments with simple apparatus are inserted in the text, and the diagrams are rather more frequent than is usually the case. It is rather a pity that some of the latter, which are evidently new, have not been printed more clearly. An unsatisfactory feature (which, however, it should in fairness be stated, is by no means peculiar to this case) is the mode of definition of the units in electromagnetism. Even if it be admitted that exact definitions are beyond the scope of this work, a *volt* should not be defined as "10/11 of the electromotive force of a Daniell's cell" without further explanation. Surely, also, the unit of current could be explained from first principles and not be defined in terms of the *volt* and the *ohm*.

(2) Here, again, we have a further addition to the numerous works on elementary practical physics. This book is, however, rather more advanced than those which have lately appeared, and, although no previous knowledge of physics is assumed, the authors claim that it contains more than sufficient matter for the intermediate examination for degrees, almost enough, in fact, for the pass final examinations. One serious objection to the publication of books of instruction in practical work is that in different laboratories different types of apparatus are usually found, a fact which would tend to limit the usefulness of the book to the students under the direction of the author, who generally bases his work upon his own course. This the present authors have endeavoured to avoid by describing experiments involving the use of standard apparatus, or that which can easily be made.

The arrangement of the book is excellent. Some 120 experiments are described and each exercise is divided as follows:—apparatus, object of experiment, theory and results. It is not intended that the instructions printed should form the whole information given to the student. This also is a good feature, for it is certain that no thorough teaching of practical physics is possible if the services of the demonstrator are dispensed with.

(3) The collection into one volume of the mathematical and physical researches of the late M. Potier is certain to direct the attention of men of science, whether physicists, mathematicians or engineers, to the wonderful versatility of the author and to demand their admiration. When it is remembered that M. Potier's geological researches (which are not included in the present collection) have rendered him eminent in that subject also, his wonderful ability becomes still more apparent. As M. Henri Poincaré (himself, unfortunately, deceased since the publication of this volume) points out in the preface, Potier was a mathematician, and undertook very little experimental work, but he nevertheless kept in touch with the results obtained by others and endeavoured to conform his mathematical researches to the experimental requirements of the case. Especially is this so in his most important papers on applied electricity, which are compiled in the second part of this volume. Indeed, his services to electrical engineering are regarded as forming the most brilliant part of his work. In the first part the memoirs on electrical theory are collected, and the third part contains those dealing with many and varied questions in light.

(4) It is indeed surprising (as the translator points out) that no English edition of this treatise of Huygens has until now appeared. Two hundred and twenty years have elapsed since the original saw light, and in the interval it has produced a more pronounced effect on the science of optics than almost any other work. It is, therefore, a matter for congratulation that the long-delayed edition is an excellent one, and it will be welcomed by all those who find delight in reading the writings of the masters in science. Not the least pleasing feature of Prof. Thompson's translation is the preservation of the old-time mode of statement, which recalls the earlier English editions of Newton's "Principia." Prof. Thompson's reason for a literal rendering is, however, more fundamental than that of making reading pleasant. He wished to avoid "importing into the author's text ideas of a subsequent date, by using words that have come to imply modern conceptions." The publishers have carried out the idea of antiquity in the type and binding and have produced a really beautiful book.

(5) Here is a book which will undoubtedly fill a gap in the various publications on physics. There is a large class of students who do not carry their studies in physics beyond the intermediate stage, branching off into engineering or medicine at that point. As a general rule, no suitable text-book provision has yet been possible in such cases. The single volumes on physics already in existence are either too simple or too difficult, and the students in question have objections to purchasing separate volumes in the various branches of the subject. It appears fairly certain, therefore, that this book of Dr. Watson's will play a

part in the more elementary stages of physics similar to that which his well-known text-book has done and continues to do in the later stages.

Considering the amount of matter involved, it is, perhaps, not surprising that the treatment seems somewhat disjointed in the abrupt passages from one section to the next. This is most marked in the part on mechanics, which, however, the author tells us, is only included on account of the requirements in the main part of the book. As a consequence, it is doubtful whether it would be possible for a student to master the subject by unaided reading; but, after all, that should not be the purpose of a text-book. It should be regarded as an aid to oral instruction. The printing and diagrams are good and in many respects the book is unique.

(6) The fifth edition of Prof. Riecke's excellent text-book has been improved and extended in various ways. On one hand we have more complete treatment of such subjects as radio-activity and the conduction of electricity in gases, which in the earlier editions were only touched upon. On the other hand, there is the introduction of new matter, comprising liquid crystals, Brownian movements and the work of Michelson and of Nernst. Like most of the German standard text-books, this one is much more complete than corresponding works in English, and it is greatly to the credit of the authors that they spare no trouble to bring the new editions of their books really up-to-date. The printing and diagrams are very much above the average. Surely there could be no better testimony of the worth of a scientific book than that it is now in its fifth edition.

(7) This book is quite a novelty. It consists of nearly fourteen hundred diagrams—curves, photographs, &c.—representing physical facts, with short explanations of each collected at the end of the book. Although, of course, it could not be regarded as a substitute for an ordinary text-book, it might well be a useful companion to the latter. The arrangements of the diagrams is occasionally somewhat inelegant, doubtless due to space considerations, but they are, as a general rule, well printed, and in every case what is represented is clearly indicated.

OUR BOOKSHELF.

Modern Problems. By Sir Oliver Lodge, F.R.S. Pp. vii + 320. (London: Methuen and Co., Ltd., 1912.) Price 5*s*. net.

A collection of essays which have for the most part appeared before as articles or addresses, but which were well worth gathering together and publishing in more permanent form. The subjects dealt with are chiefly social and philosophic—the function of money, universal arbitration and the irrationality of war, Poor Law reform, the position of woman, the drink question, the nature of time, the philosophy of Bergson—these will indicate the wide scope of the book. All the chapters are characterised by the admirably lucid yet thorough exposition which Sir Oliver Lodge's writings always present; and the conclusions, definite though cool and undogmatic, are full of that ripe wisdom which only a wide human outlook on life can give.

From the scientific point of view, one of the most interesting chapters is that on the smoke nuisance, in which the author deals with the problems of combustion, and advocates the use of gas fires and the suppression of crude combustion of coal in towns. As to river and sea mists, and fogs of non-avoidable kind, Sir Oliver suggests electrification of the atmosphere on a large scale, a plan which he has brought within measurable distance of application. This matter is again touched on in the chapter "Squandering a Surplus." No one can tell for certain what would happen by this atmospheric electrification, but it is possible and even probable that the results might be of incalculable benefit; crops might be assisted, rain produced, fog dissipated. When we think of the tremendous harmfulness of fog, financially and to the health of our citizens, it seems obvious that the prospect of a cure of this evil would justify a large national grant for expenditure on trials in a large way. It is to be hoped something of the sort may yet be done.

J. A. H.

Chrysanthemums. By T. Stevenson. With Chapters by C. H. Payne and C. E. Shea. Pp. xiv + 112. (London and Edinburgh: T. C. and E. C. Jack, n.d.) Price 1*s*. 6*d*. net.

This is the latest addition to the admirable "Present-Day Gardening" series, edited by Mr. R. Hooper Pearson. It appears at an appropriate time and will interest as well as instruct all who are concerned with the culture of chrysanthemums, whether for pleasure or profit. Though there is no reference to the existence of the plant in English gardens before 1764, it was mentioned by Confucius five hundred years or so before the commencement of our era. In the first third of the nineteenth century, about fifty varieties were known to English growers; and no attempt had been made to raise new varieties from seed. The first novelties obtained from seeds were exhibited by Mr. I. Wheeler, of Oxford, in 1832; and since then hundreds of beautiful forms have been produced. In the volume before us, details are given as to the procedure in raising seedlings and creating new varieties; and also particulars as to the care of chrysanthemums in all stages of their growth. The book will delight and assist all growers of the plant, and is a valuable addition to a series which should be known to all lovers of gardening. There are eight coloured plates showing typical flowers, and lists of varieties for cultivation as decorative plants or flowers.